

REMARKS

The Office Action dated March 7, 2005, has been received and reviewed.

Claims 1-20 are currently pending and under consideration in the above-referenced application. Claim 10 has been withdrawn from consideration. Claims 1-9 and 11-20, which have been considered, stand rejected.

Reconsideration of the above-referenced application is respectfully requested.

Rejections Under 35 U.S.C. § 112, First Paragraph

Claims 1-9 and 11-20 are rejected under 35 U.S.C. § 112, first paragraph, based on the allegation that the specification of the above-referenced application does not provide an adequate written description of the subject matter recited in any of these claims.

Specifically, it has been asserted that the specification of the above-referenced application does not provide support for the recitations of “temporary electrical contact” in independent claims 1 and 8.

M.P.E.P. § 2173.05(e) provides:

There is no requirement that the words in [a] claim must match those used in [a] specification disclosure. Applicants are given a great deal of latitude in how they choose to define their invention so long as the terms and phrases used define the invention with a reasonable degree of clarity and precision.

While the specification of the above-referenced application does not use the term “temporary electrical contact,” as recited in independent claims 1 and 8, one of ordinary skill in the art would readily understand that use of the specification of the above-referenced application provides numerous examples of methods for establishing temporary electrical contact. In particular, the specification of the above-referenced application provides examples of testing and stressing semiconductor devices. *See, e.g.*, paragraphs [0011], [0014], [0038].

The Office’s statement, at page 5 of the Final Rejection, supports the position that one of ordinary skill in the art would readily understand the meaning of the phrase “temporary electrical contact.” In particular, the Final Rejection:

It is well known in the art to test an electrical system by using a probe and by contacting designated electrical contacts. . . . This can be done after mounting, solder and wire bonding IC chips to a PCB.

In fact, U.S. Patent 6,370,766 to Degani et al. (hereinafter “Degani”), the disclosure of which has been relied upon by the Office in its rejections of the claims of the above-referenced application, teaches circuit cards with test contacts along edges thereof for temporary insertion into a tester and temporary communication with contact pads of the tester. Col. 2, lines 45-59. Such an arrangement enables “reliable robust electrical testing, including burn-in testing if required.” *Id.* One of ordinary skill in the art would immediately recognize that temporary electrical connections may be made in testing and stressing processes, as the tested or stressed semiconductor devices will be subsequently disassembled from test or stress equipment, then set aside for permanent assembly into an electronic device. Moreover, in emphasizing the temporary nature of the types of electrical connections that may be made with the test contacts of the circuit cards disclosed therein, Degani explains that “[t]he added row or rows of test contacts [on the circuit cards] can be eliminated in the singulation step,” in which separate circuit boards on a card are physically severed from one another. Col. 2, lines 59-61.

Accordingly, it is respectfully submitted that claims 1-9 and 11-20 comply with the written description requirement of 35 U.S.C. § 112, first paragraph, and requested that the 35 U.S.C. § 112, first paragraph, rejection of these claims be withdrawn.

Rejections Under 35 U.S.C. § 112, Second Paragraph

Claims 1-9 and 11-20 are rejected under 35 U.S.C. § 112, second paragraph, for reciting subject matter which is purportedly indefinite.

In particular, the Office has asserted that one of ordinary skill in the art would not understand the difference between the time frame of a “temporary” electrical contact, as recited in independent claims 1 and 8, and a “permanent” electrical contact.

It is respectfully submitted that one of ordinary skill in the art would recognize the difference in time between a temporary electrical contact and a permanent electrical contact. By way of example, without limiting the scope of any of claims 1-9 and 11-20, one of ordinary skill

in the art would recognize that a temporary electrical contact is a reversible contact, such as the types that may be employed during testing or stressing (*i.e.*, burn-in) of semiconductor devices. The corresponding time frame for a temporary electrical contact would be the amount of time needed to complete the testing or stressing process. In contrast, one of ordinary skill in the art would understand that a permanent electrical contact is a type of contact that is not intended to be reversed, such as when solder balls or other permanent connective elements are used to secure a semiconductor device to a carrier (*e.g.*, a circuit board). One of ordinary skill in the art would readily recognize that permanent electrical contacts are used to place a semiconductor device in its final state of assembly.

As indicated above, Degani evidences the fact that one of ordinary skill in the art would understand the difference between “temporary” and “permanent” electrical contacts. Additionally, at col. 4, lines 9-20, Degani notes that permanent interconnections and, thus, permanent electrical contacts have been made between the leads of semiconductor devices (components 12) and corresponding terminals (I/O contacts 14) of an individual circuit board (card site 33), whereas temporary contacts 43, which are to be used during testing or stressing of the circuit board and the semiconductor devices thereon, are provided at the edges of each individual circuit board.

In view of the foregoing, it is respectfully submitted that each of claims 1-9 and 11-20 complies with the definiteness requirement of 35 U.S.C. § 112, second paragraph. Accordingly, it is respectfully requested that the 35 U.S.C. § 112, second paragraph rejections of claims 1-9 and 11-20 be withdrawn.

Rejections Under 35 U.S.C. § 103(a)

Claims 1-9 and 11-20 stand rejected under 35 U.S.C. § 103(a) for reciting subject matter which is assertedly unpatentable over the subject matter taught in U.S. Patent 5,525,545 to Grube et al. (hereinafter “Grube”), in view of teachings from U.S. Patent 3,855,693 to Umbaugh (hereinafter “Umbaugh”) and U.S. Patent 3,612,955 to Butherus et al. (hereinafter “Butherus”) and, further, in view of the teachings of U.S. Patent 6,370,766 to Degani et al. (hereinafter “Degani”).

The standard for establishing and maintaining a rejection under 35 U.S.C. § 103(a) is set forth in M.P.E.P. § 706.02(j), which provides:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Grube suggests that a magnetic field may be used to bias an interposer 140 toward a substrate 152 and a plate 168 by which the substrate 152 is supported. Col. 14, lines 38-45. The magnetic field would cause terminals 134 of the interposer 140 to engage corresponding contact pads 158 of the substrate 152. FIG. 5; col. 13, line 49, to col. 14, line 45. As the substrate 152, interposer 140, and a semiconductor die 120 to which the interposer 140 is connected are permanently contained within a can 164 by the plate 168 (col. 14, lines 7-13; *see also* FIG. 5), the magnetic field would permanently secure the terminals 134 to their corresponding contact pads 158. Notably, the magnetic field does not directly establish electrical contact between the terminals 134 of the interposer 140 and the corresponding contact pads 158 of the substrate 152.

Umbaugh teaches that a magnetic field may be used to draw the ends 28, 30 of flexible, cantilevered leads 20 in proximity to corresponding terminal ends of circuits 14 on a substrate 12. FIGs. 3 and 4; col. 5, line 7, to col. 6, line 7; FIGs. 6-9; col. 6, line 43, to col. 8, line 5. Once the magnetic field pulls the ends 28, 30 of the leads 20 in proximity to their corresponding circuits 14, a bonding medium 36 on the circuits 14 may be heated to permanently secure the ends 28, 30 of the leads 20 to their corresponding circuits 14. Col. 4, line 60, to col. 5, line 6; col. 7, lines 39-53. Umbaugh includes no teaching or suggestion that a magnetic field may be used to actually establish any type of electrical contact between the ends 28, 30 of the leads 20 and their corresponding circuits 14, let alone a temporary electrical contact.

Degani teaches circuit cards that include a plurality of unsingulated circuit boards. Each unsingulated circuit board is configured to receive multiple semiconductor devices. In addition to the circuit boards, the circuit cards of Degani include contacts at the edges of each circuit board to facilitate testing and stressing before final packaging of the semiconductor devices takes place and circuit boards are singulated from one another. *See, e.g.*, col. 4, lines 9-20.

Butherus teaches a circuit board that includes magnetized traces and a packaged semiconductor device that includes leads that are either magnetized or formed from a material which is attracted to the source of a magnetic field. Col. 2, lines 59-75. The traces and leads are magnetized in such a way that, with rough alignment of the packaged semiconductor device over the circuit board, the magnetized leads will automatically align with their corresponding, complementarily magnetized traces. Col. 4, line 69, to col. 5, line 7.

Once the leads of the semiconductor device package are aligned with corresponding traces or terminals on the circuit board, the leads may be secured and electrically connected to their corresponding traces or terminals by known processes, such as by thermo-compression bonding. Col. 2, lines 47-59.

The Office has taken official notice of two teachings. First, the Office has taken official notice that “it is well known in the art to provide ground and power to electronic components to energize them.” Final Office Action dated December 15, 2003, page 3. Second, the Office has taken official notice that, “during burn-in testing[,] [sic] heat is provide[d] [sic] either cyclically or variously to purposely fail the [burned-in] component.” *Id.*

Independent claim 1 is drawn to a method for establishing a temporary electrical contact with at least one semiconductor device. At least one of a first member and a contact is magnetically drawn toward the other of the first member and the contact to establish a temporary electrical contact between the first member and the contact. As the temporary electrical contact is maintained, current may flow from at least one of the first member and the contact to the other of the contact and the first member.

Independent claim 8 recites a method for stress testing a plurality of semiconductor devices that are carried upon a common substrate and that are in communication with common ground and power contacts. The method of independent claim 8 includes magnetically drawing at least one of a first member of an electrical connector and at least one common contact toward the other to establish and maintain a temporary electrical contact therebetween. While the temporary electrical contact is maintained, current is permitted to flow from at least one of the first member and the contact to the other of the contact and the first member.

It is respectfully asserted that there are several reasons that a *prima facie* case of obviousness under 35 U.S.C. § 103(a) has not been established against any of claims 1-9 or 11-20.

First, it is respectfully submitted that one of ordinary skill in the art would not have been motivated to combine the teachings of Grube, Umbaugh, Butherus, and Degani with the Official Notice that has been taken.

In this regard, Degani teaches circuit cards that include temporary contacts 43. Col. 4, lines 18-31. The temporary contacts 43 facilitate testing and stressing of semiconductor devices (components 12) that are carried upon unsingulated circuit boards (individual card sites 33) of the circuit cards of Degani. *Id.* The leads of the semiconductor devices (components 12) are electrically connected to corresponding terminals (I/O contacts 14) of the circuit boards by way of permanent interconnections. Col. 4, lines 15-18.

The teachings of Grube, Umbaugh, and Butherus, in contrast, are limited to techniques that employ magnetic fields to establish permanent electrical contacts. In Grube, a magnet would presumably take the place of a corrugated spring, which biases the semiconductor die 120-interposer 140 assembly against the substrate 152 to establish electrical contact between the terminals 134 of the interposer 140 and corresponding contact pads 158 of the substrate 152. FIG. 5; col. 14, lines 18-34. Thus, the use of a magnetic field in the technique of Grube would not draw one of a member of an electrical connector and a contact toward the other.

In Umbaugh and Butherus, the magnetic field is used to align or bring leads into proximity to corresponding contacts, to which the leads are permanently connected with solder or metal.

If the teachings of Degani regarding testing of multiple semiconductor device assemblies on a card were modified in the asserted manner, the test contacts of the circuit card would have to be aligned with corresponding contact pads of a tester, such as by insertion of the test contact-bearing edge of the circuit card into a slot of the tester, then permanently connected (*e.g.*, by thermo-compression bonding, solder, etc.) to the contact pads of the tester.

Moreover, as the teachings of Grube, Umbaugh, and Butherus are limited to techniques for establishing permanent electrical contact, they would not be useful for establishing communication between temporary contacts of test or stress equipment and the temporary contacts 43 of Degani. Rather, the methods of Grube, Umbaugh, and Butherus would only be useful for establishing permanent electrical contact between the leads of components 12 and corresponding I/O contacts 14 of individual card sites 33 of Degani.

In view of the foregoing, it appears that the only source of motivation for one of ordinary skill in the art to combine the teachings of Grube, Umbaugh, Butherus, and Degani in the asserted manner would be improper hindsight provided by the disclosure of the above-referenced application.

Second, it is respectfully submitted that one of ordinary skill in the art would have no reason to expect the purported combination of teachings from Grube, Umbaugh, Butherus, Degani, and the Official Notice that has been taken to successfully result in the subject matter recited in any of claims 1-9 and 11-20.

Use of the magnetic force technique suggested in Grube and the magnetic alignment methods taught in Umbaugh and Butherus would be unnecessary in the methods taught in Degani, as Degani teaches that mechanical alignment (*i.e.*, the insertion of a side of a circuit card into a slot of a tester) is sufficient for aligning test contacts on the side of the circuit card with corresponding contact pads of the tester. Further, if permanent electrical connections of the type taught in Grube, Umbaugh, or Butherus were formed between the test contacts of the circuit card

and the contact pads of the tester of Degani, the tester could not be reused and the separate semiconductor device assemblies on the circuit card could not be singulated from one another.

Third, it is respectfully submitted that a *prima facie* case of obviousness under 35 U.S.C. § 103(a) has not been established because Umbaugh and Butherus teach away from the asserted combination with teachings from Degani, as well as from the subject matter recited in claims 1-9 and 11-20.

Again, Degani teaches circuit cards that include temporary contacts 43 for facilitating temporary electrical connections that are used to test and stress components 12 that have been secured to individual card sites 33. Likewise, the methods of independent claims 1 and 8 include “magnetically drawing” to establish temporary electrical contact. The teachings of Umbaugh and Butherus, in contrast, are limited to techniques in which magnetism is used merely to facilitate the formation of permanent electrical connections.

Fourth, it is respectfully submitted that Grube, Umbaugh, Butherus, Degani, and the Official Notice that has been taken do not collectively or individually teach or suggest each and every element of several claims.

In view of the subject matter recited in independent claims 1 and 8, it is respectfully submitted that while the Office may choose to disregard the “temporary” of the “electrical contacts” recited in these claims, the Office cannot ignore the fact that the claims require that electrical contact between a member of an electrical connector and a contact be established by magnetically drawing at least one of the member and the contact toward the other.

With respect to the subject matter recited in amended independent claim 1, none of Grube, Umbaugh, Butherus, Degani, or the Official Notice that has been taken teaches or suggests that current may flow from the leads to the terminals or vice-versa while a temporary electrical connection, established by magnetically drawing at least one of a member of an electrical connector and a contact toward the other, is maintained.

Grube, Degani and the Official Notice do not teach or suggest magnetically drawing elements toward one another to establish a temporary electrical connection. Grube suggests that a magnet could take the place of a corrugated spring 129, which biases the semiconductor die 120-interposer 140 assembly against the substrate 152 to establish electrical contact between

the terminals 134 of the interposer 140 and corresponding contact pads 158 of the substrate 152. FIG. 5; col. 14, lines 18-34. Biasing is the opposite of drawing. Degani and the Official Notice are silent as to the use of a magnetic field to “draw” one of an electrical connector and a contact toward the other.

The teachings of Umbaugh and Butherus are limited to magnetically drawing leads to terminals to align the leads and terminals or to bring the leads and terminals into proximity to one another. Umbaugh and Butherus lack any teaching or suggestion that the magnetic attraction of the leads to the terminals is sufficient to electrically connect the leads to the traces or terminals. To the contrary, Umbaugh teaches that a bonding medium 36 must be reflowed to secure the ends 28, 30 of leads 20 to corresponding circuits 14 (col. 4, line 60, to col. 5, line 6; col. 7, lines 39-53), while Butherus teaches that additional securing of leads to traces or terminals, such as by thermocompression, is necessary. Col. 2, lines 47-59. Thus, neither Umbaugh nor Butherus teaches or suggests that electrical communication is established by drawing one element toward another. Rather, electrical communication is established only after permanent bonds are formed between the elements that are to electrically contact one another.

It is, therefore, respectfully submitted that Grube, Umbaugh, Butherus, Degani, and the Office Notice that has been taken do not teach or suggest each and every element of independent claim 1.

Claims 2-7 are each allowable, among other reasons, for depending either directly or indirectly from claim 1, which is allowable.

Claim 4 is further allowable since each of the electrical connectors of each of Grube, Umbaugh, and Butherus, comprises only a single element. Thus, none of these references teaches or suggests “positioning a second member of [an] electrical connector opposite [a] first member” of the electrical connector. Degani and the Official Notice that has been taken likewise lack any teaching or suggestion of this element of claim 4.

Claim 5 depends directly from claim 4 and is also allowable because none of Grube, Umbaugh, Butherus, Degani, or the Official Notice that has been taken collectively or individually teaches or suggests that oppositely positioned first and second members of an electrical connector may be magnetically drawn to one another. The teachings of Grube,

Umbaugh, and Butherus are instead limited to directly magnetically attracting a terminal, contact, bond pad, or single-element lead to a trace or terminal.

Claim 6, which also depends directly from claim 4, is additionally allowable because none of Grube, Umbaugh, Butherus, Degani, or the Official Notice that has been taken teaches or suggests securing both first and second members of an electrical connector to a substrate by magnetically attracting at least the first member of the electrical connector to a contact carried by the substrate. The teachings of Grube, Umbaugh, and Butherus are instead limited to directly magnetically attracting a terminal, contact, bond pad, or single-element lead to a trace or terminal.

With respect to the subject matter to which independent claim 8 is drawn, it is respectfully submitted that Grube, Umbaugh, Butherus, Degani, and the Official Notice that has been taken do not provide any teaching or suggestion that one of a first member of an electrical connector and a contact may be magnetically drawn to the other to establish or maintain a temporary electrical connection therebetween. Degani and the Official Notice that have been taken do not even suggest the use of a magnetic field. Grube merely suggests that a magnetic field may be used to bias a terminal 134 of an interposer 140 toward a corresponding contact pad 158 of a substrate 152. The teachings of Umbaugh and Butherus are limited to generating a sufficient magnetic field to properly align leads of a packaged semiconductor device with corresponding traces or terminals of a circuit board. Neither Umbaugh nor Butherus teaches or suggests that electrical contact may be established by magnetically drawing the leads toward the terminals or that an electric current may be permitted to flow between the leads and terminals while such magnetic electrical contact is maintained.

Moreover, none of Grube, Umbaugh, Butherus, Degani, or the Official Notice that has been taken includes any teaching or suggestion that temporary electrical contact may be established between a first member of an electrical connector and a contact, such as a power contact or a ground contact, which is *common to* a plurality of semiconductor devices. Nor has any art been cited in the Office Action which teaches or suggests that temporary electrical contact may be established between a first member of an electrical connector and a contact which is common to a plurality of semiconductor devices during stress testing.

Further, the mere fact that electrical connections are made during testing or stressing, as mentioned in Degani, does not inherently, or necessarily, lead to the conclusion that magnetic alignment of the type taught in Umbaugh or Butherus would be adequate for establishing electrical connections that will withstand stress testing conditions, nor would one of ordinary skill in the art have any reason to expect that the type of magnetic attraction taught in Umbaugh or Butherus could be successfully used for such a purpose.

For these reasons, it is respectfully submitted that the teachings of Grube, Umbaugh, Butherus, Degani, and the Official Notice that has been taken do not support a *prima facie* case of obviousness under 35 U.S.C. § 103(a) against independent claim 8. Therefore, under 35 U.S.C. § 103(a), independent claim 8 is allowable over the teachings of Grube, Umbaugh, Butherus, Degani, and the Official Notice that has been taken.

Each of claims 9 and 11-20 is allowable, among other reasons, for depending either directly or indirectly from claim 8, which is allowable.

Claim 11 is further allowable since each of the “electrical connectors” of Grube, Umbaugh, Butherus, and Degani comprises only a single element. Thus, none of these references teaches or suggests “positioning a second member of [an] electrical connector opposite [a] first member” of the electrical connector. The Official Notice that has been taken likewise lacks any teaching or suggestion of “positioning a second member of [an] electrical connector opposite [a] first member” of the electrical connector.

Claim 12 depends directly from claim 11 and is also allowable because none of Grube, Umbaugh, Butherus, Degani, or the Official Notice that has been taken teaches nor suggests that oppositely positioned first and second members of an electrical connector may be drawn to one another. Instead, the teachings or suggestions of Grube, Umbaugh, Butherus, and Degani, are limited to attracting a single-element to a trace or terminal.

Claim 13, which depends directly from claim 12, is additionally allowable because Grube, Umbaugh, Butherus, Degani, and the Official Notice that has been taken, taken together or separately, teaches or suggests that first and second members of an electrical connector may be magnetically drawn to one another.

Therefore, the teachings of Grube, Umbaugh, Butherus, Degani, and the Official Notice that has been taken do not support a *prima facie* case of obviousness against any of claims 1-9 or 11-20. As a *prima facie* case of obviousness has not been established against any of claims 1-9 or 11-20, withdrawal of the 35 U.S.C. § 103(a) rejections of these claims is respectfully requested.

Election of Species Requirement

It is respectfully submitted that independent claim 8 remains generic to both of the species of invention that were identified in the Election of Species Requirement in the above-referenced application. In view of the allowability of independent claim 8, claim 10, which has been withdrawn from consideration, should also be considered and allowed. M.P.E.P. § 806.04(d).

CONCLUSION

It is respectfully submitted that each of claims 1-20 is allowable. An early notice of the allowability of each of these claims is respectfully solicited, as is an indication that the above-referenced application has been passed for issuance. If any issues preventing allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully submitted,



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